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# Health Consultation No. 7

*Lead by Megan Stapley  
3/8/2008*

Evaluation of Residential Well Water Within 1-Mile Radius

PRECISION NATIONAL CORPORATION  
(a/k/a PRECISION NATIONAL PLATING SERVICES)

CLARKS-SUMMIT, LACKAWANNA COUNTY, PENNSYLVANIA

CERCLIS NO. PAD053676631

DECEMBER 21, 1999

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Public Health Service  
Agency for Toxic Substances and Disease Registry  
Division of Health Assessment and Consultation  
Atlanta, Georgia 30333

## **Health Consultation: A Note of Explanation**

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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Prepared by:

Pennsylvania Department of Health  
Under Cooperative Agreement with the  
Agency for Toxic Substances and Disease Registry



## **SUMMARY**

At the request of the U.S. Environmental Protection Agency (EPA) in Region III, the Pennsylvania Department of Health (PADOH), working under a Cooperative Agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), prepared this Health Consultation (HC) to evaluate private residential well sampling results for wells within approximately a 1-mile radius of the Precision National Plating site (PNPS) in Lackawanna County and to determine if chromium is present in the water at levels that could harm peoples' health.

ATSDR and PADOH conclude that the site represents no apparent health hazard to people using private well water in residential areas evaluated in this HC.

Conclusions and recommendations regarding the PNPS are based on data currently available, site specific, and do not necessarily apply to any other site in Pennsylvania.

## **BACKGROUND AND STATEMENT OF ISSUES**

PNPS owns a chromium plating facility at 198 Ackerly Road, approximately 0.75 miles north of Clarks Summit, Pennsylvania (Figures 1 & 2). The 46-acre property is located in a rural area and has operated as a plating facility since 1956. The facility ceased operations in 1999. Historical data indicates that hexavalent chromium has migrated off the site in groundwater and has contaminated residential wells near the site [1,2,3].

The site is located in a mountainous region of northeastern Pennsylvania at an elevation of approximately 1,190 feet above mean sea level (amsl). A topographic high of 1,240 feet amsl is located approximately 400 feet south of the facility. Based on topographic data, the direction of surface drainage at the site is to the north-northwest (downhill) at a gradient of approximately 660 feet per mile. The surrounding area is drained by Ackerly Creek. The Creek flows from northeast to southwest until it reaches the Ackerly Fairground. At the fairground it makes an approximate 90 degree turn and flows NW toward the Glenburn Pond [1]. Topography and groundwater flow direction are identified in Figure 2 [2].

PADOH and ATSDR have been actively determining the public health significance of residential exposure to site-related hexavalent chromium in off-site media since October 1997 and have published a series of HCs to address community concerns [1-6]. The community outside the area addressed by these the earlier health consultations expressed concern that they may be currently exposed to chromium from the site in their private well water and requested that their water be sampled.

At the request of EPA, the ThermoRetec Corporation sampled private residential wells within approximately a 1-mile radius of the PNPS for chromium. This HC evaluates the results of that sampling and addresses the public health significance of people being exposed to trivalent or hexavalent chromium in their private well water.

## DISCUSSION

Ninety one (91) residential wells, the Blue Cross Animal Hospital, a restaurant, and the Transfiguration Byzantine Church within a approximately 1-mile radius of the site were sampled from February 2, 1999 through March 3, 1999. The samples were analyzed for total chromium and hexavalent chromium (Figure 3). Total chromium (likely trivalent) was detected in 11 of the 91 residential wells. The concentration of total chromium ranged from 6.8 micrograms ( $\mu\text{g}$ )/liter (L) to 11.5  $\mu\text{g/L}$  in 10 of the wells. The maximum concentration of total chromium (34.7  $\mu\text{g/L}$ ) was identified in the residential well number one (RW#1) immediately downgradient of the facility. Hexavalent chromium was not present above laboratory detection limits in any of these samples [7].

An additional four (4) residential wells were subsequently sampled on June 16-17, 1999. Two (2) of these new wells were in Abington Township within the 1-mile radius and two were in Glenburn Township located immediately outside of the 1-mile radius (Figure 3). The levels of total chromium and hexavalent chromium in the four residential wells were less than the detection limit and likely not present.

Chromium in the environment occurs primarily in the trivalent state (III), which is the most stable form, or in the hexavalent state (VI), which is a strong oxidizing agent. Elemental chromium (0) does not occur naturally on earth [9]. A survey of U.S. tap drinking waters reported total chromium concentration that ranged from 0.4  $\mu\text{g/L}$  to 8.0  $\mu\text{g/L}$  [10]. With the exception of RW #1, the concentrations of total chromium present in the residential wells are very similar to the range of background levels.

Trivalent chromium is thought to be an essential nutrient required for sugar and fat metabolism. Normal dietary intake of chromium for humans is believed to be suboptimal. The estimated safe and adequate daily dietary intake for trivalent chromium is 50 to 200  $\mu\text{g}$ . However, trivalent chromium has a very large safety range and there have been no documented signs of chromium toxicity in any of the nutritional studies at levels up to 1 milligram (1000  $\mu\text{g}$ ) per day. Most diets are thought to contain less than 60% of the minimum suggested daily intake of 50  $\mu\text{g}$ . As a nutrient, chromium will be of benefit only to those who are marginally or overtly chromium deficient [11].

Hexavalent chromium is recognized by the International Agency for Research on Cancer and by the U.S. Department of Health and Human Services as a carcinogen [9]. The increased risk of cancer occurs through inhalation and affects primarily the lung. Although individual studies

suggest the possibility of an excess incidence of cancer at sites outside the lung, the results from these studies are inconsistent [9]. Further, studies have shown that the available evidence strongly indicates that hexavalent chromium is changed (reduced) in body fluids and tissues to the trivalent form which greatly attenuates its potential toxicity and genotoxicity [12]. Animal studies have not shown trivalent chromium to be carcinogenic by ingestion [13]. Therefore, even in the respiratory tract which is the only consistent target of hexavalent chromium carcinogenicity in humans, there are barriers hampering its carcinogenicity [12]. These hurdles could be only overwhelmed under conditions of massive exposure by inhalation [12].

Hexavalent chromium compounds also produce an allergic contact dermatitis characterized by eczema [9]. Sensitivity to trivalent compounds is much less frequent, however, industrially, some workers may react to high concentrations of these compounds [9]. Chromium as a pure metal has no adverse effect [14].

Both acute and chronic toxicity of chromium are mainly caused by hexavalent compounds [14]. The levels of hexavalent chromium in the private wells sampled within the 1-mile radius of the site were so low that they had to be estimated by the laboratory and are essentially nonexistent. If present, the concentrations are so small that they would rapidly be reduced by body fluids into the trivalent form and are not likely to cause any health effects. Normal consumption by children and adults of the well water containing trivalent chromium at the maximum level of  $34.7 \mu\text{g/L}$  should also not harm the health of the family using this water.

ATSDR has developed health-based Comparison Values (CVs) which are chemical-specific concentrations used to determine environmental contaminants of health concern. In addition to information contained in current research literature, we base our evaluation of a potential health threat on the CVs, when they are available. These CVs include Reference Dose Environmental Media Evaluation Guides (RMEGs) and Cancer Risk Evaluation Guides (CREGs). RMEGs serve as direct comparison guides when evaluating the potential for a contaminant to cause noncancer health effects. CREGS serve as direct comparison guides for evaluating the potential for a contaminant to cause cancer.

The maximum concentration of trivalent chromium ( $34.7 \mu\text{g/L}$ ) detected during the residential sampling is substantially below ATSDR's oral drinking water RMEG for children of  $20,000 \mu\text{g/L}$  and ingestion of the water does not represent a noncancer health threat. ATSDR does not have a CREG for the ingestion of chromium. However, based on current research discussed earlier, the low levels (less than the detection limit for hexavalent chromium) also do not pose a cancer health threat. Therefore, the use of private well water, in the areas evaluated for this HC, does not pose an apparent public health hazard.

## **SITE VISITS**

Numerous site visits have been made by PADOH and ATSDR from 1997 to the present during the ongoing investigation of this site [1-6]. The residential sampling results evaluated in this HC provide further evidence that our conclusions in previous HCs regarding the extent of the groundwater plume were accurate and an additional site visit for the purpose of preparing this document was not warranted and not made [1,2,5). If ThermoRetec's sampling results had indicated that the groundwater plume extended further than previously thought, we would have conducted additional investigation and visitation at the site.

## **CHILD HEALTH INITIATIVE**

ATSDR and PADOH recognize that children may be especially sensitive when exposed to contaminants and that some chemicals are more toxic than others to young people. For these reasons, special consideration has been given to children's health when determining the public health significance of potential exposure to trivalent and hexavalent chromium in drinking water at their homes.

## **CONCLUSIONS**

ATSDR and PADOH conclude that the site represents no apparent health hazard to children and adults living in residential areas evaluated in this HC through the use of private well water. Although chromium was detected in a few private residential wells there is no known current exposure of children or adults to levels of trivalent or hexavalent chromium **at levels** that would harm their health.

## **RECOMMENDATION**

PADOH recommends no follow up activities at this time.



## REFERENCES

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3. U.S. Agency for Toxic Substances and Disease Registry, Health Consultation #3 (Soil/Sediment Sampling Location Recommendations), Precision National Corporation, Clarks-Summit, Lackawanna County, Pennsylvania, CERCLIS NO. PAD053676631. Atlanta: ATSDR, October 14, 1998.
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7. Correspondence between Paul Gruntmeyer, ThermoRetec and Sarah Caspar, EPA. Precision/Residential Data/Summary Tables. April 13, 1999.
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#### **PREPARER OF REPORT**

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## CERTIFICATION

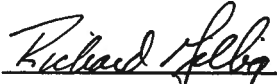
This Precision National Plating Services Site Health Consultation has been prepared by the Pennsylvania Department of Health under Cooperative Agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was initiated.



Roberta Erlwein

Technical Project Officer, SPS, SSAB, DHAC

The Division of Health Assessment and Consultation, ATSDR, has reviewed this Health Consultation and concurs with its findings.



Richard E. Gillig

Chief, SPS, SSAB, DHAC, ATSDR

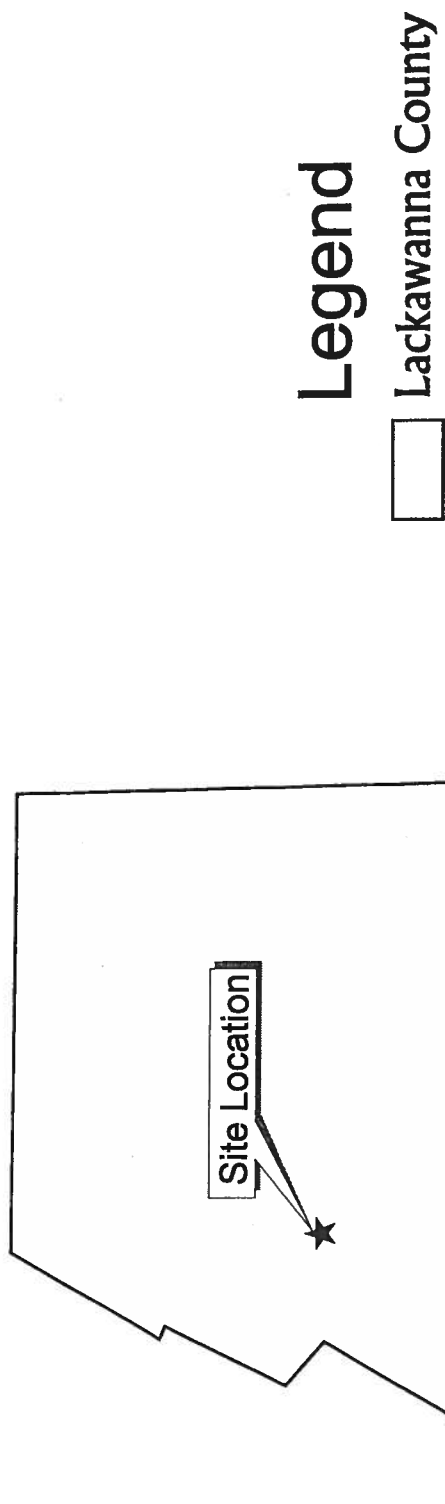


## FIGURES



Figure 1

# Precision National Site Location Map



## Legend

□ Lackawanna County



5 0 5 10 15 Miles

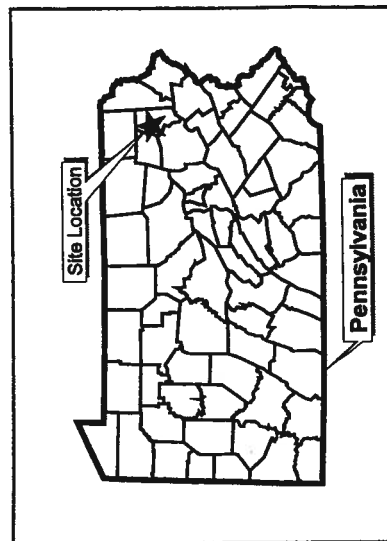


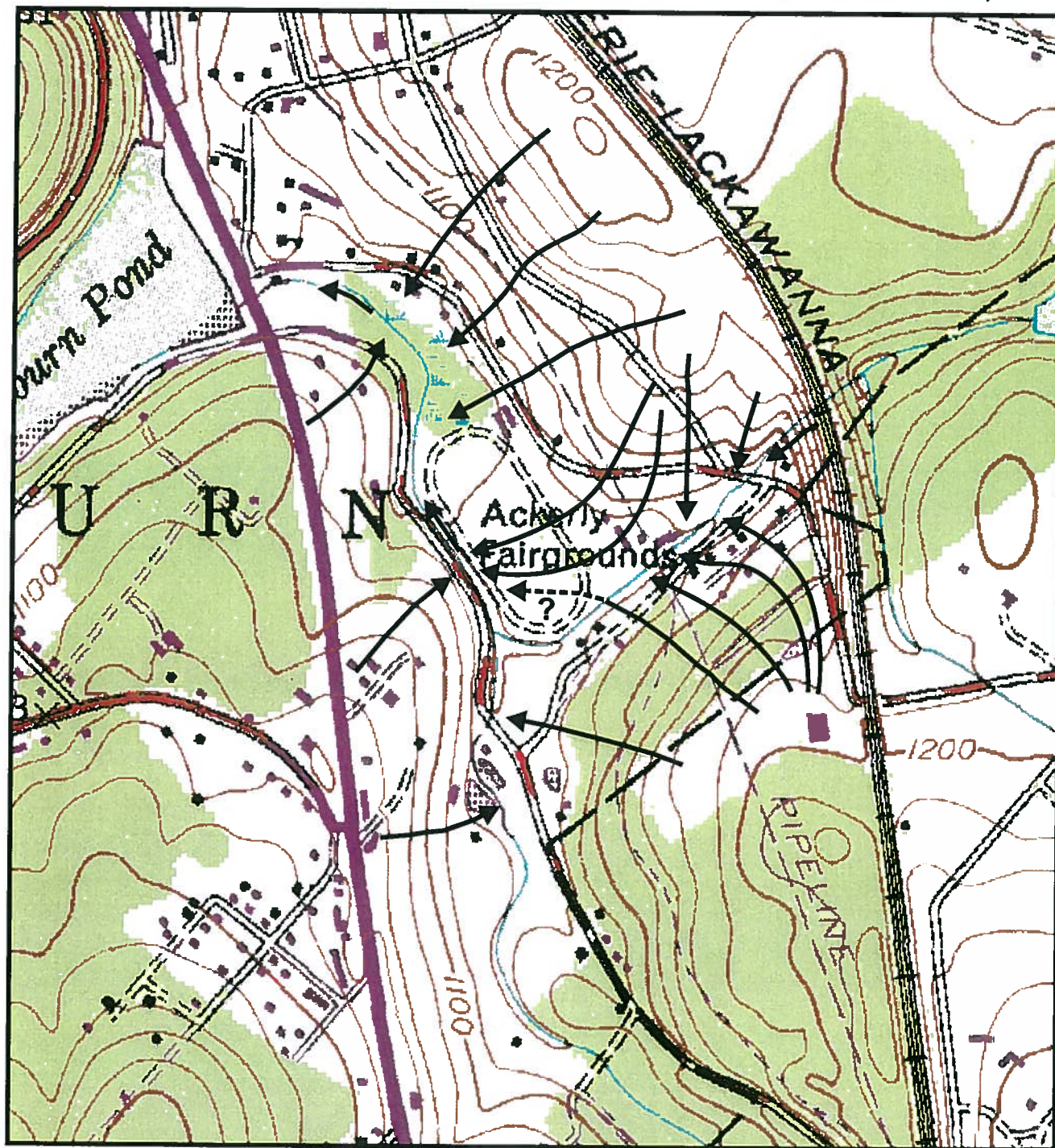




Figure 2

# Precision National Groundwater Flow

(Arrows indicate direction of groundwater flow; dashed line shows possible underflow)



1,000 0 1,000 2,000 3,000 Feet

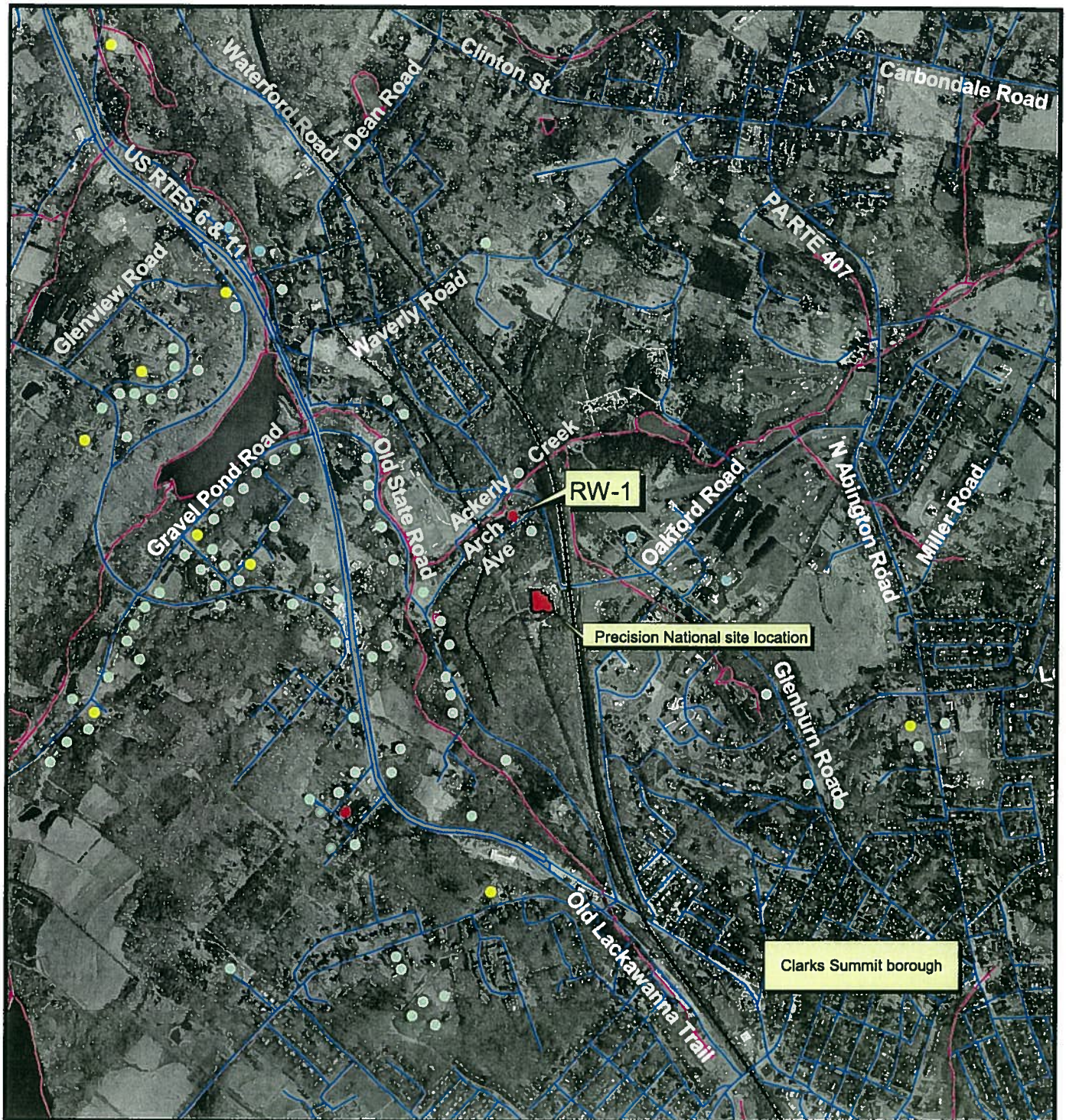






Figure 3

Precision National  
Chromium Detection Levels in Wells



0.2 0 0.2 Miles



Legend

- New well
- Cr above reporting level, below MCL ( $> 10$  ppb,  $< 100$  ppb)
- Cr below reporting level ( $> 6.7$  ppb,  $< 10$  ppb)
- Cr below detection limit ( $< 6.7$  ppb)
- Streams
- Site building
- Rails (Incl. abandoned trolley)
- Roads



